

IN THE CLAIMS

Please cancel claims 21-25, 29-30, and 36-37 without prejudice as to the filing of one or more of the cancelled claims in a continuing application.

REMARKS

With entry of this amendment, claims 21-25, 29-30 and 36-37 have been cancelled and claims 1-20, 26-28, and 31-35 are pending. The specification has been amended at page 22 to correct a typographical error. The PCT Publication Number referred to in the "Table of Abbreviations" was incorrectly listed using the International Application No. 98/13135 rather than the Publication Number. The correct PCT Publication Number is WO 99/42536. The specification has been amended to properly recite the PCT Publication Number. No new matter has been added.

Claims 1-21, 26-28, and 31-35 stand rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claimed the subject matter which applicant regards as the invention.

Applicants respectfully traverse this rejection under 35 U.S.C. 112, second paragraph, and request reconsideration of the rejection in view of the comments presented below. The Office Action states that "[t]he recited value of a peel adhesion based on an amount of a general tackifier is indefinite in not specifying a particular tackifier and amount thereof since different tackifiers and amounts thereof such as MQ silicate resins, terpene phenolic or hydrocarbon tackifier inherently would yield different values of peel adhesion in the mixture with a polyurea-based polymer." Although the incorporation of different tackifiers and amounts thereof may produce pressure sensitive adhesive compositions having different properties, for example, peel adhesion, this fact does not render the present claims indefinite under 35 U.S.C. 112, second paragraph. As set forth in the claims, adhesive compositions according to the present invention do not require more than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer to exhibit a peel adhesion of greater than about 10.0 N/dm when tested according to ASTM D3330-90 modified by substituting a glass substrate for a stainless steel substrate. Although different types

and/or amounts of tackifier in polyurea-based polymers may accomplish this peel adhesion, adhesive compositions comprising not more than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer may be easily tested according to the test procedure set forth in the claims to determine whether they fall within the scope of the present claims. Therefore, applicant has particularly pointed out and distinctly claimed the subject matter regarded as the invention.

The teaching of Seth et al. (U.S. Patent No. 5,866,222) is not relevant to the whether applicants claims meet the requirements of 35 U.S.C. 112, second paragraph. Seth et al. reports silicone copolymer modified release tapes comprising, for example, MQ resins. The portion of Seth et al. highlighted by the Examiner (i.e., col. 10, lines 60-67) pertains to the measurement of release force and re-adhesion force taken from various segmented copolymer release coating compositions comprising MQ resins using Tape A (a tackified styrene-isoprene block copolymer pressure sensitive adhesive coated on a polypropylene backing). Tape A provides the layer of pressure sensitive adhesive used to characterize the release coating compositions. Seth et al. does not relate to pressure sensitive adhesive compositions comprising MQ resins, but rather relates to release coating compositions.

In view of the foregoing, it is submitted that the rejection under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claimed the subject matter which applicant regards as the invention has been overcome and should be withdrawn.

Claims 1-21, 26-28 and 31-35 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

The Office Action states that the language of claim 1 (i.e., "wherein the polyurea-based polymer does not require greater than about 45 parts by weight tackifier") encompasses a composition without said tackifier and that "[t]he instant examples 1-3 show such composition, however, the example 1 does not yield the recited peel adhesion value greater than about 10.0 N/dm. Thus, the specification fails to

teach adequately how to control the reaction in order to obtain such (claimed) polyurea-based polymer or what structural or process limitation control the claimed property (peel adhesion and shear strength) since said examples show random results of peel adhesion and shear strength." Applicants cannot agree with the position taken in the Office Action. The present specification is complete with numerous detailed examples describing the preparation and testing of adhesive compositions of the present invention, both tackified and non-tackified embodiments. The specification contains a detailed list of starting materials, a structural representation of the polyurea-based polymers, and a complete description of the preparation of the polyurea-based polymers of the present invention including test procedures for characterizing the resulting adhesive compositions. With respect to non-tackified embodiments, the specification reports that to make inherently tacky polyurea-based polymers, the reactants are selected such that the polyurea-based polymer has a tensile modulus less than the Dalquist criterion, which is on the order of 10^5 Pa (see, pages 15-16). In order to meet the requirements of 35 U.S.C. 112, first paragraph, the specification is not required to teach every detail of the invention or to be a production specification for the claimed compositions. The specification need only explain how to make and use the invention without an inordinate (i.e., undue) amount of experimentation. One of skill in the art of polyurea-based adhesive would expect to find some variation in the peel adhesion in various embodiments of polyurea-based polymers, and would expect that some amount of experimentation would be necessary to optimize results. Here, the specification contains numerous examples to guide the synthesis of the claimed polyurea-based adhesives including two examples of non-tackified adhesives (see, examples 2-3) having the claimed peel adhesion. In view of the detailed teachings and examples in the present specification, undue experimentation would not be necessary to make and use the presently claimed invention.

The Office Action further states that the specification does not teach how to add the tackifier to the polyurea-based polymer on-web. The specification states (see, page 14, lines 16-19) that the compositions and constructions of the present invention can be made by solventless process such as reactive extrusion. As is well known to those of skill in the art, reactive extrusion involves extruding chemically reactive materials through an orifice, for example, a coating die onto a substrate such as a moving web.

The technique of reactive extrusion may be employed to polymerize compositions of the present invention on a web by extruding the chemically reactive polyisocyanate and polyamine onto a web where they are allowed to polymerize to form an adhesive composition of the present invention. As noted in the specification, polyurea-based polymers of the present invention may also be produced by continuously mixing the reactants and depositing the reactants on a surface (e.g., release liner or substrate) and polymerizing the mixture in place (see, page 14, lines 20-25).

In view of the foregoing, it is submitted that the Office Action fails to make out a prima facie case under 35 U.S.C. 112, first paragraph. Withdrawal of the rejection is respectfully requested.

Claims 13-17, 22-23, and 29 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office Action states that "[c]laims recite 'mole fraction of linkages between segments in a backbone of the polymer', however, it is unclear what constitutes said segment(s) since it can be blocks or particular functional groups." The present invention relates to polyurea-based polymer adhesives. The polyurea-based polymers include a polymer backbone formed of monomers that have chemically reacted with one another to form the polyurea-based polymer. As is commonly understood in the art, a "segment" is formed by each monomer when it reacts into the polymer chain. In view of the foregoing, withdrawal of the rejection under 35 U.S.C. 112, second paragraph, is respectfully requested.

Claims 1, 2, 4-17, 19-31, 33, 34, 36, and 37 stand rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious in view of EP 0 380 236 or Leir et al. (U.S. Patents Nos. 5,214,119 or 5,461,134).

As noted by the Examiner, the cited prior art references are substantially the same. Leir et al. (i.e., U.S. Pat Nos. 5,214,119 and 5,461,134) and Leir (EP 0 380 236) report block copolymers having a repeating unit comprised of polysiloxane and urea segments prepared by copolymerizing diaminopolysiloxanes with diisocyanates. Novel

diaminiopolysiloxanes useful as precursors in making the block copolymers are also reported as well as methods of making such diaminopolysiloxanes. Pressure sensitive adhesive compositions comprising the block copolymers are also reported.

According to Leir et al. and Leir, the segmented copolymers may be prepared with a wide range of useful properties. For example, low-adhesion backside coatings (i.e., release coatings) are reported in Leir et al. and Leir, for example, at column 8, lines 25-40 of U.S. Pat. No. 5,461,134. Block copolymers of medium molecular weight silicone segments (7,000 – 25,000) alone, or combined with other elastomeric blocks, and a hard segment in the 15-25% range, provide highly elastic, resilient, quite strong silicone elastomers. Leir et al. and Leir further report that with the high functionality of the reported silicone diamines, it is possible to prepare silicone elastomers with very high molecular weight silicone segments (25,000 – 70,000) and hard segment content as low as 0.5% to 10%. Such polymers are reported to be extremely soft and deformable and naturally of low tensile strength. It is further reported that when these silicone polyureas are blended with an approximately equal weight of hydroxy-functional silicone tackifier resins (commercially available as the MQ series, such as MQ SR-545 from the General Electric Company) a new type of silicone pressure sensitive adhesive is obtained. As reported in Leir et al and Leir, the silicone polyureas must be tackified by the addition of an approximately equal weight of hydroxy-functional silicone tackifier resin, for example, an MQ resin (see, column 8, lines 41-56 of U.S. Patent No. 5,461,134). Consistent with this teaching, in Examples 21-24, the pressure sensitive adhesives prepared had a silicone polyurea gum to MQ resin weight ratio of 1:1. In contrast to Leir et al. and Leir, claim 1 of the present invention includes the limitation that the polyurea-based polymer does not require greater than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer to exhibit a peel adhesion of greater than about 10.0 N/dm when tested according to ASTM D3330-90 (modified by substituting a glass substrate for the stainless steel substrate). Leir et al. and Leir do not teach or suggest a polyurea pressure sensitive adhesive composition having 45 parts by weight or less tackifier per 100 parts by weight polyurea based polymer. Rather, Leir et al. and Leir require about 100 parts by weight tackifier per 100 parts by weight polyurea polymer (i.e., a 1:1 weight ratio) for pressure sensitive adhesive compositions. As discussed in the instant specification, the use of

such highly tackified compositions may not be desirable in some instances because tackifiers typically include a relatively high amount of low molecular weight impurities, which may be problematic in certain applications. Also, certain tackifiers generally tend to be relatively expensive and minimizing the amount of tackifier required to achieve a certain level of performance is advantageous.

In view of the foregoing, it is submitted that the rejection under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious in view of EP 0 380 236 or Leir et al. (U.S. Patents Nos. 5,214,119 or 5,461,134) has been overcome and should be withdrawn.

Claims 1-31, 33, 34, 36, and 37 stand rejected under 35 U.S.C. 103(a) as being as being obvious in view of EP 0 380 236 or Leir et al. (U.S. Patents Nos. 5,214,119 or 5,461,134, or in view of WO 98/13135.

As discussed above, Leir et al. and Leir do not teach or suggest adhesive compositions as presently claimed by applicant. Rather, Leir et al. and Leir report materials requiring a substantially higher loading of tackifier to exhibit pressure sensitive adhesive properties. WO 98/13135 (understood to mean PCT Publication WO 98/42536) relates to hot-melt adhesive compositions comprising a blend of at least one acidic polymer and at least one basic polymer that are capable of forming thermally reversible crosslinks. There is no teaching or suggestion of applicants' claimed adhesive compositions which require a low level of tackification to achieve a peel strength of 10.0 N/dm when tested as described in instant claim 1.

In view of the foregoing, the rejection under 35 U.S.C. 103(a) as being as being obvious in view of EP 0 380 236 or Leir et al. (U.S. Patents Nos. 5,214,119 or 5,461,134, or in view of WO 98/13135 has been overcome and should be withdrawn.

Claims 1-17, 19-26, 29-31, 33, 34, 36, and 37 stand rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, as being obvious over Seth (U.S. Patent No. 5,866,222).

Seth et al. reports block, segmented or graft copolymers having polyorganosiloxane segments and self-associating hard segments. The copolymers reported in Seth et al. are capable of forming solid, generally non-tacky release coatings

without the requirement of curing. The release coatings of Seth et al. comprise a polyorganosiloxane copolymer admixed with an MQ resin wherein the amount of MQ resin is generally between 1 and 30 weight percent of the polyorganosiloxane content, preferably between 1 to 20 weight percent. The MQ resin modifies the copolymer release material to have a higher release than the copolymer itself (see Abstract).

The Office Action states that "*Seth et al. teach that a polyurea-based polymer containing 5-40% of MQ tackifier yields peel adhesion of 10.4-14.5 N/dm in table I which meets the instant invention. Thus, the same peel adhesion is called differently, PSA in the instant invention and release materials in Seth et al. Also, the instantly recited properties are inherent, and applicant has the burden of showing otherwise.*"

This interpretation of the teachings of Seth et al. is incorrect. Seth et al. reports materials useful as release coatings, that is, materials that may be applied to a substrate to facilitate the removal of an adhesive (e.g., a pressure sensitive adhesive) from the substrate. The portion of Seth et al. relied upon by the Examiner in the Office Action (Examples 1 to 8 and Table I) relates to the measured release value of a pressure sensitive adhesive tape (i.e., Tape A) from various release coatings compositions of Seth et al. The release coating compositions include various amounts of MQ resins. The release coating compositions of Examples 1 to 8 are not pressure sensitive adhesive compositions but are release coating compositions. The values reported in Table I characterize the initial and aged release of Tape A (see, Seth at column 7, lines 61-63 where Tape A is identified as a tackified styrene-isoprene block copolymer pressure sensitive adhesive coated on a polypropylene backing) from the release coating compositions of Seth et al. under various conditions. Seth et al. reports release coating compositions and does not teach or suggest adhesive compositions as claimed by applicants.

In view of the foregoing, it is submitted that the under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, as being obvious over Seth (U.S. Patent No. 5,866,222) has been overcome and should be withdrawn.

Claims 1-31, 33, 34, 36 and 37 stand rejected under 35 U.S.C. 103(a) as being obvious over Seth et al. in view of WO 98/13135.

As discussed above, Seth et al. does not teach or suggest adhesive compositions as presently claimed by applicant. Rather, Seth et al. reports release coating compositions designed to facilitate the removal of an adhesive (e.g., a pressure sensitive adhesive) from a substrate that has been coated with the release coating composition. WO 98/13135 cannot cure the deficiencies in Seth et al.

In view of the forgoing, it is submitted that the rejection under 35 U.S.C. 103(a) as being obvious over Seth et al. in view of WO 98/13135 has been overcome and should be withdrawn.

Claims 1-17, 19-34, 36 and 37 stand rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over WO 96/35458.

WO 96/35458 reports tackified compositions comprising (a) a polydiorganosiloxane comprising the reaction product of at least one amine, wherein the polyamine comprises at least one polydiorganosiloxane diamine, or a mixture of at least one polydiorganosiloxane diamine and at least one organic polyamine, and (ii) at least one polyisocyanate, wherein the mole ratio of isocyanate to amine is between 0.9:1 and 0.95:1 or between 1.05:1 and about 1.3:1, and (b) silicate resins. The tackified compositions are useful as pressure sensitive adhesives.

The Office Action states at page 7 that "WO teaches the instant composition, process of making thereof and applications at lines Tables 1-5 show the instant peel strength and sheat (sic, understood to mean "shear") strength. The adhesive composition of WO inherently yields the instant properties under the recited testing method. Thus, the instant invention lacks novelty." Although the adhesive compositions identified by the Examiner may yield the instant properties (i.e., peel adhesion of greater than 10.0 N/dm) under the test method recited in claim 1, these tackified adhesive compositions all comprise greater than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer as required in the pending claims. Applicants do not claim that they have reached a new level of peel adhesion that has previously not been attained in adhesive compositions. Rather, applicants claim adhesive compositions that have a desirably high level of peel adhesion while comprising a low level of tackifier. As discussed in the specification, a low level of

tackifier is desirable because tackifiers typically include a relatively high amount of low molecular weight impurities, which can be problematic in certain applications. Also, certain tackifiers tend to be relatively expensive. WO 96/35458 does not teach or suggest applicants' claimed adhesive compositions that do not require greater than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer to achieve a peel adhesion of greater than about 10.0 N/dm when tested according to ASTM D-3330-90 modified to use a glass substrate. Rather, the tackified adhesive compositions of WO 96/35458 include a significantly higher level of tackifier (see, for example, Table 4).

In view of the foregoing, it is submitted that the rejection under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as being obvious over WO 96/35458 has been overcome and should be withdrawn.

Claims 1-37 stand rejected under 35 U.S.C. 103(a) as being obvious in view of WO 98/13135 or Wright et al. (U.S. Patent No. 6,224,949 B1).

As discussed above, WO 96/35458 does not teach or suggest applicants claimed adhesive compositions that do not require greater than about 45 parts by weight tackifier per hundred parts by weight polyurea-based polymer to achieve a peel adhesion of greater than about 10.0 N/dm (when tested according to ASTM D-3330-90 modified to use a glass substrate). WO 98/13135 (understood to mean PCT Publication WO 98/42536) and Wright et al. do not cure the deficiencies in WO 96/35458. Wright et al. relates to a method of free radical polymerization. Wright et al. does not teach or suggest applicants claimed polyurea-based polymers. WO 98/13135 (understood to mean PCT Publication WO 98/42536) relates to hot-melt adhesive compositions comprising a blend of at least one acidic polymer and at least one basic polymer that are capable of forming thermally reversible crosslinks. There is no teaching or suggestion of applicants' claimed adhesive compositions which require a low level of tackification to achieve a peel strength of 10.0 N/dm when tested as described in instant claim 1.

In view of the foregoing, it is submitted that the rejection under 35 U.S.C. 103(a) as being obvious in view of WO 98/42536 or Wright et al. (U.S. Patent No. 6,224,949 B1) has been overcome and should be withdrawn.

Allowance of the application at an early date is respectfully requested.

Respectfully submitted,

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APPENDIX TO AMENDMENT OF JANUARY 28, 2002.

Version with Markings to show Changes Made

Please amend page 22 as set forth below.

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|---------------------|---|
| <u>PDMS diamine</u> | an approximately 5,000 molecular weight polydimethylsiloxane diamine prepared as described in Example 2 of U.S. Patent Number 5,214,119 |
| MQ resin | a 60% solids solution of MQ silicate resin in toluene, commercially available from GE Silicones; Waterford, NY under the trade designation SR545 |
| ACP | An acid-containing polymeric material, specifically an 80/20 isooctyl acrylate/acrylic acid copolymer PSA such as those described in PCT Publication No. WO [98/13,135] <u>99/42536</u> |
| PHR | parts per 100 parts polyurea-based polymer |

EXAMPLE 1

In a glass reactor equipped with a magnetic stirrer was placed 20.0 grams of JEFFAMINE DU700 and 44.8 grams of 2-propanol to yield a homogenous solution. To this was added, with mixing, 5.20 grams of TMXDI. After one hour of stirring, 0.16 gram of DYTEK A and 0.71 gram of DESMODUR W H12MDI were added to the solution and mixed for one day. The solution viscosity rose during this mixing.

The resulting solution was cast onto PET and dried at 70°C for 10 minutes to yield a 25 micrometer-thick coating. The peel adhesion and shear strength values for this adhesive are recorded in Table 1.

Example 2

In a glass reactor equipped with a magnetic stirrer was mixed 12.0 grams of JEFFAMINE D400, 55.6 grams of 2-propanol, and 8.0 grams of JEFFAMINE D2000,

to yield a homogenous solution. To this was added, with mixing, 8.02 grams of TMXDI. After one hour of stirring, 0.01 gram of DYTEK A and 0.05 gram of DESMODUR W H12MDI were added to the solution and mixed for one day. The solution viscosity rose during this mixing.

The resulting solution was cast onto PET and dried at 70°C for 10 minutes to yield a 25 micrometer-thick coating. The peel adhesion and shear strength values for this adhesive are recorded in Table 1.